

June 10, 2008

TOPIC: GENERIC SAFETY ISSUE (GSI)-191, "ASSESSMENT OF DEBRIS ACCUMULATION ON PWR [PRESSURIZED-WATER REACTOR] SUMP PERFORMANCE"

INDUSTRY: NUCLEAR ENERGY INSTITUTE (NEI)  
ELECTRIC POWER RESEARCH INSTITUTE (EPRI)  
WESTINGHOUSE  
ENERCON, ALION AND WESTINGHOUSE  
FRAMATOME  
GENERAL ELECTRIC  
SARGENT & LUNDY  
ATOMIC ENERGY OF CANADA

SUBJECT: SUMMARY OF MEETING ON APRIL 13 AND 14, 2005, TO DISCUSS THE RESOLUTION STATUS OF GSI-191

On April 13 and 14, 2005, members of the U.S. Nuclear Regulatory Commission (NRC) staff met with industry at Two White Flint North in Rockville, Maryland, to discuss the resolution status of GSI-191. The meeting was a Category 2 public meeting. Most of the first day was open to public observation. The last two sessions on April 13th, and all sessions on April 14th were closed to the public to discuss proprietary information. No Public Meeting Feedback forms were received. The agenda is available in the Agencywide Documents Access and Management System (ADAMS) under Accession No. ML050890113. A list of attendees is included as Attachment 1. The ADAMS accession numbers for the presentation slides and other handouts used by the NRC, EPRI, and Westinghouse staff during the open portion of the meeting are included as Attachment 2.

The meeting provided an opportunity for NRC staff to present an update of research being conducted by Los Alamos National Laboratory under NRC sponsorship. Research activities are ongoing to evaluate chemical and downstream effects in representative plant sump environments. The NRC staff stated that some results from the first two tests that industry requested will be made publically available by April 22, 2005. In addition, more detailed and complete information will be provided to the public and industry for each completed test as it becomes available. The NRC staff also provided some recommendations on using the results from this testing in plant evaluations and identified follow-on tests that would be valuable for industry to conduct.

EPRI provided an overview of ongoing testing of original equipment manufacturer coatings. The results presented are considered preliminary, and will need to be further evaluated before they can be used for input to the sump evaluation issue. The NEI/EPRI agreed to continue with this effort and provide updates in the near future.

The Westinghouse Owners Group (WOG) presented a draft methodology for evaluation of downstream effects. The overview is based on proprietary information that was not immediately available. The NRC staff and WOG agreed that additional communication and evaluation are needed in this area. The NRC staff will contact the WOG representatives to determine the best method to move forward with this new information.

In response to an industry question about Section 3.7.2.2.3 of the NRC staff safety evaluation (SE) issued on December 6, 2004 (ADAMS Accession No. ML043280007), the NRC staff decided to clarify the guidance. Specifically, the staff will clarify the choice of sump pool temperature for calculating (1) the sump screen head loss caused by debris and (2) the net positive suction head. The SE evaluated the industry's report, NEI-04-07, "Pressurized Water Reactor Sump Performance Evaluation Methodology" (ADAMS Accession No. ML050550138). The SE and NEI-04-07 support the licensee's responses to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors" (ADAMS Accession No. ML042360586).

During the public meeting session, the NRC staff responded to questions raised during an NRC/NEI meeting held in January regarding the de-aeration phenomenon. The staff clarified the positions in the SE and indicated that the 3 percent debris bed exit void fraction limit was established not only as the limit to the single-phase based head loss correlation, but also a practical limit to prevent pump cavitation. Staff used the recently developed confirmatory computer code to demonstrate the sensitivities of the bed exit void fraction to other thermal-hydraulic parameters. By request of the industry, the computer code will be issued to the public for scoping analyses.

The staff also presented their observations from the 90-day responses and expectations for the September 1, 2005, responses to GL 2004-02 during the public meeting session. In particular, the staff noted that some licensees indicated in their 90-day responses that the analysis of chemical effects may be delayed until testing is complete. In response, the NRC staff reiterated their position in the SE and GL 2004-02 that licensees need to address chemical effects in their September 1, 2005 GL responses. The staff's position is that the September response will be incomplete if the evaluation is incomplete, the design is not complete, or there is no schedule for upgrades. There were numerous industry questions and concerns on how to address chemical effects when the testing is not complete or in situations where no test data exists. In response, the NRC staff stated that there are sufficient enough reasons to address sump vulnerability and reiterated the position in the SE that in the absence of test data, licensees should apply a technically-justified margin to their analysis to account for the chemical effects.

The staff and industry agreed to meet sometime in May 2005 shortly after industry has had time to evaluate the test results to be released on April 22, as discussed above.

Please direct any inquiries to Michael Webb at 301-415-1347, or [MKW@nrc.gov](mailto:MKW@nrc.gov).

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Attachments: As stated

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NRC MEETING WITH INDUSTRY  
APRIL 13 AND 14, 2005

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Ailsa Eyvindson	AECL
Buddy (Robert) Taylor	AECL
Rob Choromokos	Alion Science
Clint Shafter	ARES Corp
Gordon Wissenger	Areva
Lee Williams	Areva - FANP
Mark Kostelnik	Constellation Energy
Scott Wihlen	Constellation Energy
Michael Kai	Dominion
Russ Oakley	Duke Energy
Aaron Smith	Enercon
Saif U. Khan	Entergy
Timothy Eckert	EPRI
John Gisclon	EPRI
Brian Davenport	Exelon
Brian Dunn	FPL
Rufus Drury	GE
Jeffrey Hamel	GE
Ike Ezekoye	Hudson Global/Westinghouse
Steven Dolley	Inside NRC
Vesselin Palazov	ISL, Inc.
Dan Prelewicz	ISL, Inc.
Kazz Kishioka	JAPC
Tomoko Yamada	JNES
Deann Raleigh	LIS, Scientech
James Wong	NMC
Bernie Van Sant	OPPD
Michael Friedman	OPPD
Jim Bleigh	PCI
Addison Ricker	Proto-Power
Bob Peterson	Sargent & Lundy
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Altheia Wyche	SERCH Licensing/Bechtel
Edison Carmack	SNC
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Chuck Feist	TXU Power
Tim Andreychek	Westinghouse
Jeffrey Bass	Westinghouse
Paul Pyle	Westinghouse

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NRC MEETING WITH INDUSTRY

APRIL 13 AND 14, 2005

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John Hannon	NRC
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Christopher Hunter	NRC
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Paul Klein	NRC
Mark Kowal	NRC
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Louise Lund	NRC
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Harry Waggage	NRC
Michael Webb	NRC
Leon Whitney	NRC
Matt Yoder	NRC

APRIL 13-14, 2005  
PUBLIC MEETING WITH NUCLEAR ENERGY  
INSTITUTE (NEI) REGARDING THE RESOLUTION STATUS OF THE PWR SUMP  
BLOCKAGE ISSUE (GSI-191)

Accession Numbers for the presentation slides and other handouts

NRC	Research Activities	ML051100021
NRC	Latent debris report technical report package	ML051020181
	Screen penetration technical report package	ML051020166
NRC	Surrogate throttle valve drawings	ML051100467
		ML051100479
EPRI	OEM Unqualified Coatings Testing	ML051100483
Westinghouse	Evaluation of Downstream Sump Debris Effects in Support of GSI-191	ML051100491
NRC	Generic Letter 2004-02 90-day Responses	ML051100512
NRC	Update on Pilot Plant Activities	ML051100522
NRC	De-Aeration Phenomenon and SE Position Clarification	ML051100525
NRC	Bulletin 2003-01 Status	ML051100528

## **Choice of Sump Pool Water Temperature for Calculating the Sump Screen Head Loss from Debris and NPSH Available**

### **Background**

Section 3.7.2.2.3 of the industry's report, NEI-04-07, "Pressurized Water Reactor Sump Performance Evaluation Methodology," (ADAMS Accession No. ML050550138) recommended the following options for the choice of the sump pool water temperature for calculating the sump screen head loss from debris and net positive suction head (NPSH) available:

- Option 1. The temperature at which the head loss is evaluated should be consistent with the temperature used for the NPSH evaluation.
- Option 2. The head loss is to be evaluated at multiple times when different temperatures and flows exist during an accident.
- Option 3. The maximum expected temperature may be used for the NPSH analysis, whereas the lowest expected temperature during emergency core cooling system (ECCS) operation may be taken for the head loss analysis.

Of these the NRC staff accepted Option 3 as the most conservative choice as stated in Section 3.7.2.2.3 of the SE issued on December 6, 2004 (ADAMS Accession No. ML043280007). That is, licensees were asked to use the maximum expected sump pool temperature for calculating the NPSH available while using the minimum expected sump pool temperature for calculating sump screen head loss from debris. However, licensees expressed concerns over calculating the sump screen head loss from debris because using the minimum temperature would be excessively conservative as that temperature and the maximum temperature for calculating NPSH available occur at two different times.

In response, the NRC staff provides the following clarification to SE Section 3.7.2.2.3 for the choice of the sump pool water temperature for calculating the sump screen head loss from debris and NPSH available.

### **Clarification**

The staff determined that Option 1 is a viable choice if the licensees show that the sump screen head loss from debris is less than the NPSH margin for *all* expected temperatures of the sump pool water during the ECCS operation. This involves determining the sump screen head loss from debris and calculating for the range of temperatures between the expected minimum and maximum temperatures of sump pool water.

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Project 689

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